

Case Report

Accidental fatal asphyxiation by sand inhalation

F.A. Benomran MB ChB, DCH (Professor of Forensic Medicine)*,
A.I. Hassan MB ChB, MSc (Forensic Medical Examiner)

*Forensic Medicine Department, General Department of Forensic Science, Dubai Police General Headquarters,
P.O. Box 39844, Dubai, United Arab Emirates*

Received 25 November 2007; accepted 26 January 2008
Available online 10 April 2008

Abstract

A 36 year old laborer was pronounced dead by the casualty doctor on arrival to the hospital. To avoid blame, witnesses and fellow workers fabricated a scenario that resulted in the doctor certify death as due to myocardial infarction. The body was then taken to the mortuary of the Department of Forensic Medicine as a routine procedure to furnish a medico-legal report, which is a pre-requisite for bodies to be taken out of the country. No external injuries were found by the authors who noted deposition of sand all over the clothed body of the deceased. Some sand was also seen inside eyes, mouth and external ear canals. X-ray examination showed radio-opacities in pharynx, larynx, trachea, bronchi and esophagus. The forensic medical examiners (authors) requested permission for autopsy from the director of public prosecution. Autopsy demonstrated that death was due to asphyxiation due to inhalation and swallowing of sand. Consequent on the opinion of the forensic medical examiners the police opened an inquiry. It was established that the deceased was accidentally buried alive when a wheeled loading shovel emptied its load of sand over him at a construction site. The initial misdiagnosis was attributed to failure of the hospital doctor to realize the significance of the presence of sand in exposed orifices. The false account of the circumstances of death had also contributed to that misdiagnosis.

© 2008 Elsevier Ltd and FFLM. All rights reserved.

Keywords: Accidental asphyxiation; Industrial accidents; Suffocation; Sand inhalation

1. Introduction

Inhalation of foreign material into the respiratory tract is one of the mechanisms of mechanical asphyxia. Cases of death from inhalation of stomach contents were reported, especially as a complication of acute alcoholic intoxication. Fatal suffocation resulting from inhalation of sand due to accidental burial is a very rare event. Absence of injuries in such cases is attributed to the soft consistency of sand. The presence of sand inside eyes, nostrils, mouth and ear canals should arouse suspicion. One of the aims of teaching forensic medicine to medical students is to make them aware of the signs pointing to the possibility of unnatural manners of death. Contrary to the forensic

medical examiner, treating doctors tend to believe the account of the circumstance of death in the same manner that they would believe histories given by their patients. Doctors must have a low threshold of suspicion to be able to identify foul plays regarding circumstances of illness and death.

In this case, witnesses, who had been the victim's colleagues, not only withheld truth but gave false information in order not to take the blame for his accidental death. Their untruthfulness deceived the hospital physician, but not the forensic medical examiners, who established the cause of death through alertness and proper management.

2. Case report

The body of a 36 year old expatriate laborer was referred to the department of forensic medicine by a district

* Corresponding author. Tel.: +971 42663065; fax: +971 42171324.
E-mail address: Benemran@hotmail.com (F.A. Benomran).

police station in the course of routine referral scheme. The reason for referral was to obtain a medico-legal report based on provisional external examination, which is a legal requirement for transferring bodies out of the country. The referral letter of the police described the death as due to natural causes, and stated that the deceased collapsed at his place of work and taken to hospital where he was pronounced dead on arrival. The attached medical certificate of cause of death stated that death resulted from myocardial infarction.

The male adult deceased was 168 cm in height and weighed 75 kg. He was wearing a blue colored working uniform. External examination showed considerable deposition of sand all over the clothing and the exposed parts of the deceased's body (Fig. 1). Some sand was also present inside the nostrils, eyes, mouth (Fig. 2) and external ear canals (Fig. 3). After unclothing the body, sand was also seen on the unexposed areas of the body i.e. chest, and umbilicus (Fig. 4), armpits (Fig. 5) and pubic area. However, no external injuries were detected except a small pressure abrasion on the nose. X-ray examination showed radio-opacities in pharynx, larynx, trachea, bronchi and esophagus (Figs. 6 and 7). On grounds of these findings, the forensic medical examiners (authors) requested permission for autopsy from the director of public prosecution.

Autopsy demonstrated the presence of grayish sand inside the pharynx, and along the entire lumen of esophagus (Fig. 8). The larynx, trachea and bronchi were also full of the same material (Fig. 9). The stomach contained a small quantity of semi digested food mixed with sand (Fig. 10). Dissection of the markedly congested and edematous lungs showed sand particles inside the bronchi-



Fig. 2. Sand in the eyes, mouth and nostrils of the deceased.

oles (Fig. 11). Frothy edematous fluid issued forth from its cut surfaces by moderate compression (Fig. 12). Histopa-



Fig. 1. Sand deposition on the clothing and exposed parts of the deceased's body.



Fig. 3. The left ear of the deceased showing sand deposition.



Fig. 4. Chest and abdomen showing sand deposition on chest and in the umbilicus.

thology of the lungs showed sand particles as far inside as the small bronchioles. The alveoli were dilated and hemorrhagic, and its walls destroyed.

Other autopsy findings included generalized congestion of the brain and viscera. The heart weighed 360 g, its coronary arteries showed moderate atherosclerotic changes, particularly in the main right coronary, but no evidence of myocardial infarction.

Toxicological investigation showed no alcohol or drugs in the blood sample.

It was concluded that the cause of death was asphyxiation due to sand inhalation. Consequent on the opinion of the forensic medical examiners the police opened an inquiry. It was established that the deceased had been working in a construction site when he was buried by a

heap of sand emptied accidentally over him by a wheeled loading shovel. The initial misdiagnosis was attributed to failure of the hospital doctor to realize the significance of the presence of sand in exposed orifices. The fabricated account of the circumstance of death had also contributed to that misdiagnosis.

3. Discussion

This case represents a unique accidental death at work place due to burial with sand unloaded from a wheeled loader shovel. The mechanism of death is asphyxiation by inhalation of sand inside the respiratory passages. Burial with sand may be described as a form of smothering, although the introduction of the material inside airways does not comply with the typical mechanism of pure smothering, which is defined as suffocation by blocking of external air passages.

Although suspicion of the medical examiners was confirmed by X-ray examination, determination of the cause of death required a full autopsy. The diagnosis was ascertained by the presence of sand in the air passages as well as the upper gastrointestinal tract. It was essential to establish that the deceased had actively inhaled sand while he was alive. The extent of the penetration of sand, as well as the severe congestion and edema in the air passages are indicators to that effect.

Postmortem examination by a medico-legal expert, which is a pre-requisite for bodies to be taken out of the United Arab Emirates, continue to prove its role in ascertaining the unnatural cause of death in ambiguous circumstances.



Fig. 5. Sand on the right arm, right armpit and chest.

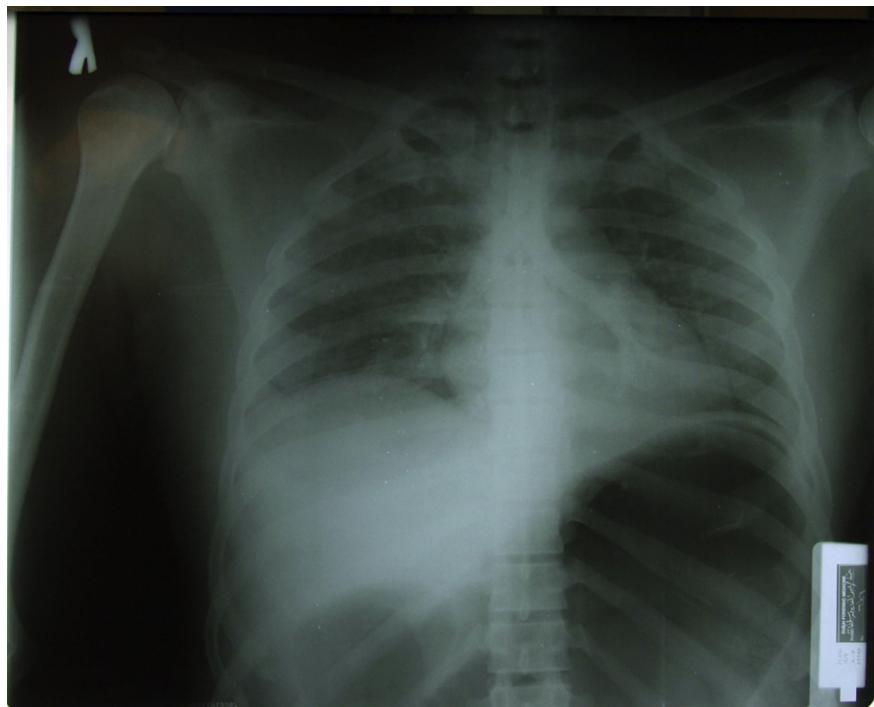


Fig. 6. Chest X-ray showing radio-opacities along the area of the esophagus and air passages.



Fig. 7. Lateral view of the head and neck showing radio-opacities along the pharynx and larynx, upper trachea and esophagus (teeth show removable dentures).



Fig. 8. Autopsy view of the slit-opened pharynx and esophagus to demonstrate extensive sand deposition.



Fig. 9. Autopsy view of the slit-opened trachea and bronchi showing sand deposition.

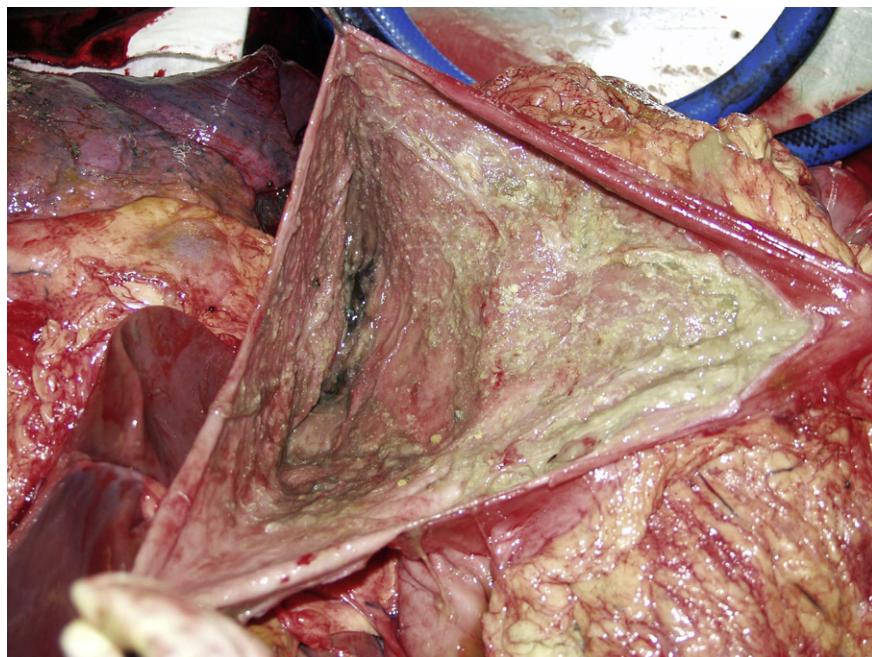


Fig. 10. The inside of the stomach with sandy material mixed with a minimal quantity of digested food.



Fig. 11. The cut surface of the lung showing marked congestion and edema with frothy exudates as well as sand particles expressed from the small bronchioles.



Fig. 12. Frothy edematous fluid mixed with sand inside the bronchi and the bronchioles.